



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,940	02/20/2004	Ju-Jin An	8054-26 (AW8120US/JY)	4785
22150 7590 04/06/2007 F. CHAU & ASSOCIATES, LLC 130 WOODBURY ROAD WOODBURY, NY 11797			EXAMINER DEO, DUY VU NGUYEN	
			ART UNIT	PAPER NUMBER
			1765	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/06/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication..

**Office Action Summary**

Application No.

10/783,940

Applicant(s)

AN ET AL.

Examiner

Duy-Vu N. Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 5, 7-9, 11-13, 15, 17, 18 and 20-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9, 11-13, 15, 17, 18 and 20-23 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7, 8, 24-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 5, 7, 8, 24- 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art, Iyer et al. (US 6,383, 723), and Schulz (US 5,637,151).

Admitted prior art describes a method for etching a conductive film, such as polysilicon, metal, and metal compounds, comprising: forming an insulating oxide layer on a substrate, forming a conductive film on the insulating oxide layer, forming an ARC film, such as silicon oxide, nitride, and silicon oxynitride (this would form oxide residues), on the conductive film, forming a photoresist pattern on the ARC film, patterning the conductive film using the photoresist pattern (specification, pages 1-3).

Unlike claimed invention, admitted prior art doesn't suggest cleaning the ARC film using a first and second cleaning solutions. Iyer describes a method for etching substrate wherein he teaches cleaning the ARC film, including silicon oxide, nitride, and oxynitride, by a first sulfuric acid solution and a second DI water (claimed second solution) (col. 3, line 10-20, line 30-col. 4, line 8) before applying the photoresist on the ARC film. It would have been obvious for one skilled in the art at the time of the invention to modify admitted prior art in light of Iyer's teaching of cleaning the ARC film

Art Unit: 1765

because he teaches that by cleaning the ARC film before forming the photoresist would reduce the defects such as resist footing and T-topping (ab.; col. 3, line 55-65). These cleaning solutions would clean any oxide residues on the ARC film.

Applied prior art above doesn't suggest the second cleaning solution includes SC-1. Schulz describes a method for cleaning substrate including a sulfuric cleaning solution and a SC-1 cleaning solution afterward (figs 1 and 2). It would have been obvious for one skilled in the art at the time of the invention to modify applied prior art in light of Schulz's teaching of using SC-1 because it would improve remove particles from the surface of the wafers (col. 1, line 44-49; col. 2, line 1-5; ab.).

Referring to claims 2 and 25, admitted prior art describes the oxide residues are generated from a purge gas containing nitrogen oxide (page 3 of the specification).

Referring to claims 5 and 15, Iyer describes the first sulfuric cleaning is done at T 70-150 degree Celsius and for about 5-50 mins (col. 4, line 9-17).

Referring to claims 7, 17, and 26, even though Iyer doesn't describe the second cleaning step, DI water rinsing, is performed at a T 30-70 degrees Celsius for about 5-15 mins; however, one skilled in the art would find it obvious to determine the T and time of the DI water rinsing through routine experimentation given the facts that Iyer teaches ranges for the T and time in the first cleaning of using the sulfuric acid.

Referring to claim 8, even though applied prior art doesn't describe the first and second cleaning process are done in-situ; however, this is a cleaning process, one skilled in the art would find it obvious to do these cleanings in-situ because it would

Art Unit: 1765

eliminate the transferring step, if not done in-situ, which can cause airborne contamination of the substrate during the transferring step.

Referring to claim 24, the steps for forming a volatile memory cell, including forming a transistor and a pad, forming a contact hole through an insulating layer and an ARC layer to the pad and forming a contact plug in the contact hole are known to one skilled in the art (please see page 2 of the specification and Nesbit et al. (US 6,686,668) cited below).

### ***Response to Arguments***

3. Applicant's arguments filed 2/14/06, referring to claims 1-3, 5, 7, 8, 24-27 have been fully considered but they are not persuasive.

Applicant's argument that Schulz teaches a modified SC1 is acknowledged. However, it is still considered SC1 solution. Unless, applicant claims specific chemicals of a SC1 solution, Schulz's modified SC1 still read on claimed SC1 and therefore, would satisfy claimed consisting essentially of SC1.

### ***Allowable Subject Matter***

4. Referring to claims 9, 11-13, 15, 17, 18, 20-23, applicant's argument that Okoroanyanwu doesn't describe the a hardmask comprising forming a first anti-reflective layer on the conductive film, forming an oxide film on the first anti-reflective layer, and forming a second anti-reflective layer on the oxide film is found persuasive. The claims are now allowed.

***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duy-Vu N. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1765

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Duy-Vu N Deo  
Primary Examiner  
Art Unit 1765



4/2/07